DRAFT AMENDMENT TO THE ENVIRONMENTAL ASSESSMENT

TILAPIA REMOVAL PROGRAM ON THE VIRGIN RIVER, CLARK COUNTY, NEVADA, AND MOHAVE COUNTY, ARIZONA

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FISH AND WILDLIFE SERVICE
SOUTHERN NEVADA FIELD OFFICE
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1.0 INTRODUCTION

1.1 Purpose and Need

In October 2002, the U.S. Fish and Wildlife Service (Service) completed and submitted an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the Blue Tilapia (*Oreochromis aurea*) (tilapia) Removal Program on the Virgin River, Clark County, Nevada and Mohave County, Arizona. The purpose of this action was to eliminate tilapia from the Virgin River between the Mesquite and Bunkerville agricultural diversions (River Miles [RM] 63.30 to 59.25), and to prevent tilapia from invading the upper Virgin River watershed. Under Council of Environmental Quality (CEQ) regulations a supplemental EA is prepared when, "There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts" (40 CFR 1502.9). This proposed action would extend the area of treatment, concentration of treatment, and range of dates available for treatment; therefore an amendment is required.

This project is part of a program developed by the Lower Virgin River Recovery Implementation Team (RIT), whose goal is to recover endangered fishes within the lower Virgin River. The goal of the project is to prevent the spread of tilapia from the Bunkerville irrigation diversion to the Littlefield Springs area near Littlefield, Mohave County, Arizona and further upstream. It is imperative that tilapia are prevented from becoming established in the lower Virgin River in order to keep them from invading and threatening native fish populations in the upper Virgin River watershed, as well. The need for the proposed project arises from the probability of severe impacts to native fishes due to the introduction of a new non-native competitive and predatory fish. If tilapia reach and inhabit the Littlefield Springs portion of the Virgin River, then eradication within the springs would be extremely difficult due to the continuous outflow of spring water, as well as the existence of a large localized population of native fish. In addition, there are no fish barriers between Littlefield Springs and the Virgin River Gorge, Arizona, thereby complicating fish removal projects in this river reach. Therefore, implementation of the proposed project would prevent tilapia from becoming established within the lower Virgin River above the Bunkerville irrigation diversion and moving upstream to further impact populations of the native fish.

The long-term objective of this project is to remove a threat to the fishes of the Virgin River that are listed under the Endangered Species Act of 1973, as amended, (Act),

which would assist in furthering recovery of the species. The Virgin River Fishes Recovery Plan (Recovery Plan) (Service, 1995) delineates reasonable actions which are believed to be required to recover and/or protect listed species. This proposed project is consistent with tasks 1.21 and 1.22 of the Recovery Plan, which state that fish barriers should be established at suitable sites along the Virgin River, and non-native fish species should be eradicated or reduced from below Johnson Diversion, Washington County, Utah, to Lake Mead, respectively.

This Amendment:

- Describes the current status of the previously approved action,
- and describes proposed changes to the previously approved action.

This Amendment to the Environmental Assessment (AEA) is intended to satisfy Service and National Environmental Policy Act (NEPA) requirements to allow for changes to project components. This AEA relies on, and incorporates by reference, information presented in the original EA with respect to the description of the affected environment, discussion of environmental consequences, and development and analysis of alternatives. This AEA will present the proposed action, alternatives considered, affected environment, and environmental consequences of the proposed action related to the Tilapia Removal Program.

1.2 Background

Blue tilapia are warm water fish native to northern Africa and the Middle East, and are commonly used in aquaculture as a food fish. Tilapia were first discovered in southern Nevada in the Muddy River in 1992, which were present as a result of an illegal introduction. By 1996, tilapia had emigrated throughout the Muddy River. In 1994, tilapia were captured in the Virgin and Temple basins of Lake Mead, and have since been captured by the Nevada Department of Wildlife (NDOW) throughout the lake. Surveys for woundfin (*Plagopterus argentissimus*) on July 26, 2001, by NDOW, detected the presence of young-of-the-year tilapia within the Virgin River from below the Bunkerville Diversion to Halfway Wash (RM 42), implying that adult tilapia were present and had spawned in the Virgin River. This was the first time tilapia were collected in the Virgin River.

Tilapia have the potential for causing environmental disturbance within the areas they occupy. Surveys in the upper Muddy River and Warm Springs area correlated the presence of tilapia to a drastic decline in the number of the endangered Moapa dace (*Moapa coriacea*) and Moapa White River springfish (*Crenichthys baileyi moapae*)(Scoppettone, 1998). Scientific literature describe tilapia as planktivorous or herbivorous (Trewavas, 1983). However, stomach analyses of tilapia obtained from the Muddy River by the U.S. Geological Survey Biological Resources Division indicated that they are omnivorous, feeding on a wide range of vegetable and animal material,

including fish. Many of the fish identified in tilapia stomach content samples were native, implicating tilapia as a cause of decline in the native Muddy River fishes (Scoppettone, 1998). Additionally, it is also believed that tilapia impact the invertebrate community by eating both the invertebrates and the vegetation which supports them. Therefore, it is likely that tilapia within the Virgin River system, would predate and/or compete with native fishes, including the federally-endangered woundfin and Virgin River chub (*Gila seminuda*)(chub), causing further decline in these populations.

Since tilapia are a warm water species, it is believed that tilapia cannot survive in sustained temperatures under 5° C (Stauffer, 1988). However, blue tilapia appear to be the most cold tolerant of the mouth-brooding tilapia (Zale and Gregory, 1989), and variability exists in the literature describing lethal temperature limits (Starling, et al., 1995; Zale and Gregory, 1989). Although information from Lake Mead indicates that tilapia could thrive in cool water (possibly by finding a thermal refugium), the Virgin River may be too cold during winter for tilapia to survive outside of warm spring sources. One such source exists near the Interstate 15 bridge at Littlefield, and other springs or seeps may be present throughout the system. Tilapia present in these spring sources would likely be relatively unaffected by cold winter temperatures and undergo an explosive population growth when the water warms.

Current impediments to upstream fish movement are the Bunkerville and Mesquite irrigation diversion structures. Although the diversion structure itself may act as a barrier to upstream movement, the irrigation canals originating at the diversion may facilitate fish movement. Typically, a portion of the irrigation water is rediverted directly into the Virgin River through a sediment-sluicing gate downstream of the diversion structure. Although the Mesquite diversion is engineered in a fashion which impedes fish, the design of the Bunkerville diversion essentially causes the irrigation ditch to function as a side channel to the river, especially during low flows. The normal flows through the ditch are not an effective barrier to upstream fish movement. It is unknown to what capacity the ditch impedes upstream fish movement during higher flows.

Given the current state of the Virgin River and the invasion of tilapia, it has been determined by the RIT, which is composed of members from BIO-WEST, Inc, Southern Nevada Water Authority, NDOW, Arizona Game and Fish Department, Bureau of Reclamation, and the Service, that tilapia must be prevented from traveling upstream of the Mesquite diversion and into the warm water springs. Two actions are necessary to prevent this from happening: Eliminating tilapia in the vicinity below the diversion structures and retrofitting the irrigation system to prevent upstream fish movement. The only feasible way to completely eliminate tilapia is through a program utilizing chemical treatments of the river with piscicide.

The RIT completed a pilot rotenone treatment on October 29-31, 2002, which encompassed the section of river between the Bunkerville irrigation diversion and the Highway 170 Mesquite Bridge. This treatment was successful in removing tilapia and

other non-native fish, though non-native fish have since colonized this area from downstream. This treatment also calibrated sampling efforts in the area and provided insight on treating additional portions of the Virgin River.

1.3 Rotenone as a Fisheries Management Tool

Rotenone is a naturally occurring substance derived from a South American plant, and has been commonly used historically as a method to capture fish by South American tribes. Rotenone has been used as a fisheries management tool since 1934, and has a long history of successful applications. Rotenone is a non-systemic inhibitor of cellular respiration in animals, and is most toxic when taken into the body through absorption into the blood across gill membranes. Due to this route of exposure, it is selective for animals which breath through gills, or absorb dissolved oxygen in water for respiration. Ingested rotenone at treatment concentrations is typically neutralized within the digestive tract of animals by enzymes. Concentrations of between 0.5 to 10 parts per million (ppm) of rotenone are typically used for fisheries applications. Rotenone is commonly utilized by fisheries managers to eliminate undesirable fish within systems where mechanical means are not efficient. Examples of this include elimination of competitory fish in trophy fisheries and removal of harmful non-native fish in systems where native fish are preferred.

Rotenone is also used on dairy cows and gardens as an insecticide. There are no known effects to non-gilled vertebrates or humans from the application concentrations or residue. Rotenone is naturally rendered non-toxic by sediments in streams, or it can be detoxified by using potassium permanganate. Rotenone has been used as a management tool throughout the southwest, including Nevada, Arizona, and Utah. The Utah Division of Wildlife Resources has had success with similar rotenone projects in the upper Virgin River in the vicinity of St. George, Utah (Comella and Fridell, 1998; Fridell, et al., 2001).

1.4 Previous and Related Reports

On October 4, 2002, the Arizona Ecological Services Field Office of the U.S. Fish and Wildlife Service issued a non-jeopardy Biological Opinion (File Number 2-21-02-F-0299) (BO) to the U.S. Fish and Wildlife Service's Southern Nevada Field Office (SNFO) for the tilapia removal program on the Virgin River, Mohave County, Arizona, and Clark County, Nevada, by the RIT.

On October 23, 2002, the SNFO issued an Environmental Assessment for the Tilapia Removal Program on the Virgin River, Clark County, Nevada, and Mohave County, Arizona.

2.0 DESCRIPTION OF ALTERNATIVES

2.1 Background

Seven alternatives, including the No Action alternative, were considered in the original EA. Alternative 1, also known as the Piscicide, Detoxification Station, and Barrier Alternative, was chosen to be implemented. This alternative involved treating the area beginning in the Fall of 2002, and as needed, from the Mesquite diversion structure downstream to the State Highway 170 Mesquite Bridge (RM 58) using a treatment plan developed by NDOW. Treatments are intended to keep tilapia from becoming established between the Bunkerville and Mesquite diversion structures after barriers are constructed. In association with this treatment, a fish barrier may be constructed within the Bunkerville Ditch. This barrier will be addressed in the future pending project design and is discussed only as reference. Based on further discussion by the RIT, as well as experience gained during the initial treatments, it was determined that the project area covered under the original EA was insufficient, and the time frame that allowed treatments needed to be broader.

The proposed changes in the AEA do not alter the Purpose and Need as stated in the original EA, nor do they raise new unresolved issues that would need to be addressed in an additional alternative. The original range of alternatives was found to be adequate in responding to the Purpose and Need identified in the original EA.

2.2 Modifications to the Piscicide, Detoxification Station, and Barrier Alternative

Proposed modifications of the Piscicide, Detoxification Station, and Barrier Alternative of the original EA consist of changes in scope of actions. Actions described in the original EA would be implemented with the following changes.

2.2.1 Change in Treatment Location

This AEA will add the length of the Virgin River from the Highway 170 Mesquite Bridge, downstream to the northern boundary of the Virgin River Bowl, Lake Mead, Clark County, Nevada, to the description of the area of potential treatment. The change in treatment area is intended to allow for more flexibility in determining the mechanism by which tilapia invade the system, as well as to eliminate concentrations of tilapia that may take refuge in pools downstream of the permitted treatment reach. It is anticipated that the spot treatments would be isolated in nature, and not encompass the entire reach at one time. Changes in treatment locations would necessitate changing detoxification station locations. Detoxification stations would be located downstream of the treatment area at a site determined by the certified applicator to maximize effectiveness.

2.2.2 Change in Rotenone Concentration

This AEA will change the permitted treatment concentration of rotenone from 2 parts per million (ppm) to a concentration not exceeding 5 ppm. This is to obtain consistency with the Nevada Department of Environmental Protection (NDEP) permit pertaining to the

action covered under the previous EA, as well as product labeling as required by Section 136j(a)(2)(G) of the Federal Insecticide, Fungicide, Rodenticide Act of 1972, as amended. There may also be a need in some instances for a higher concentration of rotenone, since some tilapia were able to effectively avoid mortality during the pilot treatment at concentrations of 2 ppm. All work, including treatment concentrations, would be performed under provisions outlined by NDEP and/or the State of Arizona permits.

2.2.3 Change in Treatment Times

This AEA will extend the allowed dates for treatment to year-round during appropriate flows. Within the original EA, blackout dates for the treatment ranged from early May to mid September to avoid bird nesting. This precluded treating isolated pools during the summer months that typically have the lowest flows of the year, which would be desirable to eliminate groups of tilapia as well as to survey the fauna of the pools.

2.4 No Action Alternative

The no action alternative describes the continuing unmodified implementation of the Piscicide, Detoxification Station, and Barrier Alternative of the original EA. Treatment of the reach between the Mesquite Diversion, Mohave County, Arizona, and the Highway 170 Mesquite Bridge would continue as planned in the original EA.

A No Action alternative would result in a failure to effectively investigate distribution of tilapia and to eliminate tilapia downstream of the treatment area. This would result in a lesser degree of efficiency in the original treatment area, as nearby tilapia would be in greater numbers and closer proximity, facilitating movement into the treated reach. In addition, data would not be collected on fish species, including tilapia, utilizing pool habitats. Due to logistical and physical constraints, there are no other effective methods to accurately survey these habitats. This would result in an incomplete knowledge regarding the dynamics of tilapia use of the lower river.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The affected environment and environmental consequences analysis in the original EA were reviewed and were found to be adequate for Physical Resources, Air Quality, Noise, Land Use, Visual Resources, Vegetation, Wildlife, Paleotological Resources, Cultural Resources, Socioeconomic Issues, Indian Trust Assets, and Environmental Justice. This AEA shall not cover these categories and refers the reader to the original EA. The changes in the Piscicide, Detoxification Station, and Barrier Alternative were determined by the Service to require additional analysis to Water Resources, Aquatic Resources, and Threatened and Endangered Species.

3.1 Water Resources

Streams and Wetlands, Water Quality, and Groundwater are described in the original EA. Descriptions of Streams and Wetlands, and Water Quality, would be changed by this AEA. An additional 35 kilometers of the Virgin River downstream of the Highway 170 Mesquite Bridge may be affected, as well as additional wetlands. The description of Groundwater would not be significantly different from the original EA.

3.1.1 Potential Effects and Environmental Consequences of the Proposed Action Alternative

Project actions would not affect groundwater resources. The presence of wetlands would not be diminished, although the water quality of more wetlands would be impacted by the expanded area. Effects of this alternative would include temporary deterioration of the water quality within the proposed project area from the addition of piscicide and detoxification agent over a greater area and range of dates than was described in the original EA. Although the piscicide and potassium permanganate would degrade water quality in respect to gill-breathing organisms, there would be little effect to water quality in respect to other organisms at the proposed concentrations. Although rotenone is approved by the Environmental Protection Agency for use as a pesticide, is not approved for human consumption by the Food and Drug Administration, thus, although water in the Virgin River is currently not potable, water quality would further be affected and not recommended for use as drinking during treatment. Since rotenone and its detoxification agent are rapidly broken down in water that has a high organic load, temperatures, alkalinity, light exposure, and turnover, as well as the short period of time that rotenone is applied, water quality would rapidly improve downstream and within the treatment area. Since rotenone is not persistent, it will not accumulate and persist in wetlands. Rotenone is also fairly non-mobile, and it is expected to leach approximately 2 centimeters in typical soils, and a maximum of 8 centimeters in sandy soils typical of the Virgin River, until it is degraded (AFS, 2002). Rotenone and potassium permanganate application would not alter the physical characteristics (temperature, pH, etc...) of the existing water quality.

Potassium permanganate is an inorganic chemical used as a commercial and domestic disinfectant. Typical uses include treatment of drinking water, fungicide for ponds, sanitizers and deodorizers. Potassium permanganate rapidly breaks down into potassium and manganese, both common existing elements, in the environment (Finlayson et al, 2000).

3.1.2 Potential Effects and Environmental Consequences of the No Action Alternative

This alternative would prevent effects of piscicide and detoxification agent as described above to the water resources present in the proposed section of the Virgin River.

3.2 Aquatic Organisms

Aquatic Organisms are described in the original EA. The scope of impacts would be changed by the AEA. Approximately an additional 35 kilometers of the Virgin River downstream of the Highway 170 Mesquite Bridge would be affected, as well as additional wetlands over a greater time frame. This would increase the numbers of aquatic organisms impacted by the proposed project.

3.2.1 Potential Effects and Environmental Consequences of the Proposed Action Alternative

This alternative would temporarily eliminate essentially all of the fish within the treatment areas, as well as lower the abundance of aquatic invertebrates in the main channel and major side channels or backwaters. This amendment proposes to use rotenone to treat at a variety of areas downstream of the Highway 170 bridge to the northern boundary of the Virgin River Basin, Lake Mead, Clark County, Nevada, which is historically poor fish habitat at low flows, which are the only times that would be treated. It is expected that rapid colonization of fish (larval and adult) and invertebrates from upstream of the project area would occur during connected periods, as well as providing for enhanced establishment of stocked fish if determined prudent by the RIT. Recent collections have found relatively few native fish downstream of the Mesquite Irrigation Diversion, negative effects would be focused on non-native and undesirable fish species. Construction of the barriers and elimination of tilapia from within the treatment area would provide a long term benefit to the native aquatic organisms of the lower Virgin River by the preventing or reducing predatory and competitory nonnative fish. It has been proposed to construct a barrier on the mainstem of the lower Virgin River, which would enhance protections outlined in the EA and AEA. Tilapia, and other non-native fish that are able to survive in the lower Virgin River, would be reduced through implementation of the program described within this AEA. This would inhibit recolonization of the upper treated areas by these fish until funding for a barrier is obtained and implemented.

Other non-target organisms that may be directly affected by the rotenone include amphibians and reptiles. Larval amphibians are gilled, and therefore affected by rotenone. Larval native amphibians typically do not overwinter prior to metamorphosis, and likely would not be present during the late summer and fall, which are when treatments are the most effective due to flow characteristics and most treatments would

likely occur. Also, spot treatments would occur in the deeper pools and river reaches, which are not frequented by amphibian larvae. It is unlikely that amphibian larvae would occur during summer in the lower river due to predatory fish. The non-native spiny softshell turtle occurs within the project area. Turtles may be affected when they depend upon cloacal or pharyngeal ventilation for breathing. Since this is not the only option for their breathing, there will be minimal effects on the turtle population.

3.2.2 Potential Effects and Environmental Consequences of the No Action Alternative

The No Action Alternative would allow for tilapia to gather below the treated area described in the original EA, and rapidly recolonize the treated area below the Bunkerville diversion during connectivity. The probability of tilapia migrating around the Bunkerville diversion into the treated area would be increased, which would then require retreatment. The RIT would also not gain insight to the mechanics of tilapia invasion within the lower Virgin River. Impacts of tilapia would then be as described in the original EA.

3.3 Wildlife

Wildlife are described in the original EA. The scope of impacts would be changed by the AEA. An additional 35 kilometers of the Virgin River downstream of the Highway 170 Mesquite Bridge would be affected, as well as additional wetlands over a greater time frame. Therefore, the numbers of wildlife impacted by the proposed project would increase.

3.3.1 Potential Effects and Environmental Consequences of the Proposed Action Alternative

Wildlife in the project area may be temporarily displaced during access to a greater portion of the river. Stream bank and streambed habitat would be minimally disturbed, but through encroachment, the vegetation would return to pre-construction conditions. Application of rotenone may lower populations of aquatic insects, which in turn may lower the availability of prey to riparian birds, lizards, or small mammals due to a smaller flight of emerged insects. This effect would likely be short term, as more insects are recruited back into the system from upstream, and there would be fewer aquatic predators, such as red shiners (*Cyprinella lutrensis*) and mosquitofish (*Gambusia affinis*), to predate on insect larvae. Most wildlife that would be affected by lack of insects are mobile, and would not rely exclusively on the insects or fish eliminated by rotenone within the project area. In addition, there is likely a substantial population of insects that act as wildlife prey within the fringe shallows and marshes that will not be impacted by the rotenone. Aquatic insects have been shown to be a minor portion of lizard diets (Smith, et al. 1987), with Odonata comprising two percent of zebra-tailed lizard

(Callosaurus draconoides) diet. All odanates identified in stomach samples during early September, with the remainder of diets consisting of terrestrial arthropods and vegetation (Smith, et al., 1987). This study suggests that this species, as well as other lizards with similar ecological parameters, are opportunists and temporary elimination of aquatic insects would not greatly effect the population within the project area.

3.3.2 Potential Effects and Environmental Consequences of the No Action Alternative

This alternative would eliminate effects to wildlife from additional access to treatment sites. There would also be no effect to aquatic invertebrates that would have occurred due to application of rotenone. Proliferation of tilapia would likely have little or no effect on terrestrial wildlife, though they may create a change in the population dynamics of fish that are prey to piscivorous birds, as well as lower the abundance or alter the species composition of emergent aquatic invertebrates. The continued presence of tilapia, especially if they invade the Littlefield Springs area, would have detrimental effects upon the aquatic wildlife, including native frogs and toads. Larval amphibians would be exposed to another predator who maintains a different niche than the current suite of predators, resulting in a different avenue of predation. The presence of tilapia may decrease the value of the Virgin River as a potential reintroduction site for native species, such as relict leopard frog (*Rana onca*).

3.4 Threatened and Endangered Species

On October 4, 2002, the Arizona Ecological Services Field Office of the U.S. Fish and Wildlife Service issued a non-jeopardy Biological Opinion (File Number 2-21-02-F-0299) (Opinion) to the SNFO for the tilapia removal program on the Virgin River, Clark County, Nevada, by the RIT (Service, 2002a). This Opinion included determinations for the endangered woundfin, Virgin River chub, Southwestern willow flycatcher (*Empidonax traillii extimus*), Yuma clapper rail (*Rallus longirostris yumanensis*), and the yellow-billed cuckoo (*Coccyzus americanus*), which is a candidate for listing.

Woundfin

Woundfin are presently known to occupy the proposed project area (Figure 1), and all native fish within the proposed project area would be taken in the form of harassment or killing either due to salvage operations or rotenone toxicity. However, only very limited numbers of woundfin are anticipated to occur within the treatment reach and all individuals captured will be translocated upstream of the treatment area. Recent survey efforts under low flow conditions have indicated that there are very low numbers of native fish species present within the reach proposed for treatment (Mike Golden, Fisheries Biologist, BIO-WEST, Inc, personal communication, 2003) and where feasible,

ongoing biological survey efforts in this reach will be utilized to salvage, remove and translocate individual native fishes in advance of the treatment activities.

Woundfin numbers in the lower Virgin River fluctuate greatly, depending on stocking rates and environmental conditions. In June 2000, woundfin numbers were estimated by Holden and Golden (2000) to be 625 adults, with a standard error of 97, between the Bunkerville and Mesquite Diversions. In addition, a total of 242 young-of-the-year woundfin were captured. These numbers were influenced by the stocking of 9,500 woundfin within the Nevada portion of the reach between the Bunkerville and Mesquite Irrigation Diversions during October 1999. Up to 50 woundfin were also captured in a five-mile stretch below the Riverside bridge during four sampling trips between May and August, with a capture rate of up to 0.59 per seine haul in July 2000 (Holden and Golden, 2000). However, no woundfin have been captured at the Riverside area since June of 2001.

No stocking of woundfin has occurred since October 2000. River flow (all seasons) and clarity were not favorable for woundfin from 2000 through 2002. Additionally, 4,500 woundfin were stocked above the Bunkerville Irrigation Diversion in October 2000, but none have been stocked since that time. These factors resulted in lower numbers of woundfin in the lower Virgin River in 2001. The greatest number of woundfin captured were 146 individuals during standardized sampling of the reach between the Mesquite and Bunkerville Irrigation Diversions in March 2001. These fish were a result of the October 2000 stocking. Surveys of the reach between the Mesquite and Bunkerville Irrigation Diversions from July 2001 to December 2001 resulted in between 0 and 15 woundfin, with numbers typically below 5 individuals (Golden and Holden, 2001; Mike Golden, personal communication, 2003). Three woundfin were captured in this area in early 2002, but none have been detected since April 2002. Below the Bunkerville Irrigation Diversion only one woundfin has been collected since June 2001. This fish was salvaged from immediately below the Bunkerville Irrigation Diversion during the pilot rotenone treatment in October 2002. Woundfin have not been captured at Halfway Wash since 1999 (Jim Heinrich, Nevada Department of Wildlife, personal communication, 2003; Mike Golden, personal communication, 2003).

Virgin River chub

Virgin River chub has experienced a general decline in Utah, Arizona, and Nevada, particularly since the mid-1980s. In the site of the proposed action, chub are uncommon and generally occur within the deep pools associated with runs. Younger fish occur in shallower water than adults and are occasionally captured by seining during woundfin sampling. It is extremely rare for a chub to be captured downstream of the Bunkerville irrigation diversion, and a total of ten chub have been detected in the proposed area by Biowest since 1996 (Mike Golden, personal communication, 2003).

Razorback Sucker

Razorback sucker (*Xyrauchen texanus*) and their critical habitat occur in Lake Mead. Two spawning locations are known in Lake Mead: Echo Bay in the Overton Arm, and Las Vegas Bay, both in Clark County, Nevada. Echo Bay is approximately 9 miles from the Lake Mead confluence of the Virgin River and the terminus of the proposed treatment area. Razorback suckers have been monitored using larval trapping, trammel nets, and sonic tagging within the Overton Arm of Lake Mead, and none were located near the Virgin River (Abate, et al. 2002; Abate et al., 2001; Holden et al. 2000).

Southwestern willow flycatcher

Southwestern willow flycatcher (flycatcher) is present in the Nevada portion of the Virgin River, and surveys have detected this species near the location of the proposed project. McKernan and Braden (2002a) detected 11 breeding territories at the Mesquite West Study Area, which occurs on the Virgin River downstream of the State Route 170 bridge, during surveys in 2000. Surveys of this site in 2001 located 26 individual flycatchers and 20 nests (territories) (McKernan and Braden preliminary unpublished data, 2002). Flycatchers also breed near Mormon Mesa, and 28 pairs were present during 2001. It is also likely that the flycatcher moves throughout the Virgin River corridor including the proposed project area during post-breeding dispersion, as well as during migration.

Yuma clapper rail

Yuma clapper rail (rail) is known to breed at several sites on the lower Virgin River floodplain (McKernan and Braden 2002b). Surveys in 2001 detected 16-18 pairs of rails and 4 fledgling rails in marshes along the lower Virgin River near Mormon Mesa and the confluence with Lake Mead (McKernan and Braden preliminary unpublished data, 2002). Surveys by McKernan and Braden (2002b) in 2000 detected up to four individual rails in marshes along the Virgin River and Beaver Dam Wash near the Interstate Highway 15 Littlefield Bridge in Arizona. Rathburn and Braden (2003) report lower numbers of rail on the Virgin River, with a total of five detections, two at the Mesquite Highway 170 Bridge and the rest in the vicinity of the Mormon Mesa. There has been no other known detections of this species within the proposed project area.

Yellow-billed cuckoo

Yellow-billed cuckoo have been seen on the Virgin River downstream of the proposed project area [State Highway 170 Bridge, Riverside, Clark County, Nevada, Shawn Goodchild, Service, personal observation, 2001; State Highway 170 Bridge, Mesquite, Nevada, McKernan and Braden (2002b)]. McKernan and Braden (2002b) also reported yellow-billed cuckoo presence near the Interstate 15 Littlefield Bridge, as well as in the Virgin River near Mormon Mesa, in 2000. In 2001, cuckoo nests and six to eight

individuals were detected in dense tamarisk at the Mormon Mesa area (McKernan and Braden preliminary unpublished data, 2002). No cuckoos were found on the Virgin River during 2002 surveys (Rathburn and Braden, 2003).

3.4.1 Potential Effects and Environmental Consequences of the Proposed Action Alternative

Given the recent drought conditions and low productivity of native fish, it is unlikely that chub or woundfin occur within the area described by the AEA. As a result there would be no impact to chub or woundfin as a result of the actions described in this AEA beyond what is described in the original EA. Detoxification stations would prevent toxicant from reaching Lake Mead, and detoxicant would be diluted and bound with organics upon reaching Lake Mead, thereby becoming biologically inactive and non-toxic to fish. Therefore the proposed project would not impact the aquatic resources in Lake Mead, including the razorback sucker, if present.

Depending on timing, southwestern willow flycatcher, Yuma clapper rail, and/or yellow-billed cuckoo may be present during the proposed treatment. Southwestern willow flycatcher and yellow-billed cuckoo may be impacted by a short term reduction of emergent insects, though these birds, especially the cuckoos, will likely have alternate food sources available. Emergent insects, and other aquatic invertebrates, would recolonize the sites from upstream. Yuma clapper rail may be affected by reduction in aquatic prey numbers, though this is likely to be minimized since the rail also forages in habitats that will not likely be affected by rotenone. In addition, only pool habitats and deeper runs that may contain tilapia would be spot treated, leaving untreated waters with intact invertebrate populations. Crayfish are resistant to rotenone at the treatment dose and form a large part of the rail's diet. If present, all of the bird species may be temporarily impacted by disturbance during treatment activities on the river.

Immediately downstream of the detoxification station, there would be a significant amount of potassium permanganate present in the water. Although the potassium permanganate would rapidly break down into potassium and manganese, both common existing elements, in the environment (Finlayson et al., 2000), there is a slight toxicity to aquatic organisms, albeit lesser than rotenone. It is anticipated that there may be slightly more effects to the threatened and endangered species due to increased bank disturbance, but there would be less insect larvae disrupted due to the quicker elimination of rotenone, lessening the effect as a result of elimination of invertebrate prey.

There is a probability that elimination of tilapia would benefit insectivorous birds over time, since removal of tilapia would allow for submergent vegetation growth and associated increased diversity of invertebrate assemblages.

3.4.2 Potential Effects and Environmental Consequences of the No Action Alternative

The No Action Alternative would allow for tilapia to gather below the treated area described in the original EA, and rapidly recolonize the treated area below the Bunkerville diversion during connectivity. The probability of tilapia migrating around the Bunkerville diversion into the treated area would be increased, which would then require retreatment. Impacts of tilapia would then be as described in the original EA. Impacts to the local ecosystem, primarily invertebrates and aquatic plants, as a result of tilapia would remain unchanged.

3.5 Cumulative Effects

Cumulative effects include the effects of future Federal, State, local, or private actions on affected environment that are reasonably certain to occur in the action area considered in this Environmental Assessment.

Cumulative effects include construction of fish barriers in irrigation canals, development of fish barriers in other portions of the Virgin River, other fisheries activities on the river including stocking, monitoring and non-native removal. These cumulative effects would be beneficial to native fishes.

Potential future municipal, rural, or agricultural development affecting the Virgin River watershed and its aquifer, changes in patterns of groundwater pumping, as well as activities resulting from public visitation, including recreation, vandalism, refuse, and disturbance of local habitat, fish, and wildlife, may result in cumulative effects to the affected environment.

The combination of these cumulative effects do not significantly detract from the value of Alternative 1, as they are already affecting the current conditions of the project area. Implementation of the preferred Alternative will result in a net benefit to the environment while the cumulative effects would remain at current levels, thereby resulting in an overall gain in quality of environment without increasing negative impacts.

3.6 Irretrievable Resources

Irretrievable resources include an irreversible or irretrievable commitment of resources for the proposed action. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of the resources would have on future generations. Irreversible effects primarily result from the use of destruction of a specific resource (e.g. energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g.

extinction of species or disturbance of cultural site). For the proposed action, resource commitments are neither irreversible nor irretrievable, and impacts are short term and temporary.

4.0 OTHER NEPA CONSIDERATIONS

4.1 Environmental Commitments

The Service will require compliance with the following environmental commitments if the changes to Alternative 1 are implemented. These commitments would offset any potential environmental effects from the Action Alternative. The RIT will be responsible for complying with these commitments and the Service will monitor activities to ensure compliance. These environmental commitments have been developed in consultation with Federal and State Agencies. These commitments append, modify, or supercede commitments listed in the EA.

The following Environmental Commitments will minimize or eliminate effects to project area resources and will ensure compliance with applicable Federal and State regulations. Additional commitments may be identified in Federal and State compliance documents.

Efforts would be made to initiate treatments when neotropical migrant birds are not present, if feasible.

Efforts would be made to spend the least amount of time as necessary in marsh situations to limit effects to wildlife.

Treatments would be isolated to the smallest area necessary to achieve desired results.

Rotenone will be detoxified prior to entering Lake Mead.

Efforts will be made to salvage as many native fish from the sites as possible, with minimal handling as to reduce stress and then relocated to suitable habitat upstream.

Fish barriers will be constructed as needed to prevent further infestation of tilapia.

Rotenone use will be carefully monitored by licensed pesticide applicators as required by State law.

Rotenone and detoxification agent effectiveness will be closely monitored through the use of multiple bioassays. Dedicated crews will adjust concentrations to achieve desired results, though rotenone concentrations will not be increased past the Nevada Division of Environmental Protection permitted level.

All dead large-bodied fish, such as carp, and concentrations of dead small-bodied fish, will be removed to the greatest extent possible, especially near public access points. Fish will either be disposed of in a landfill, buried, or preserved for further studies or analysis.

Existing access roads or trails would be used to the greatest extent possible to prevent damage to vegetation.

Efforts will be made to avoid thistle, as well as other native vegetation, during activities on the river.

All work will occur during weekdays when visitation is lowest.

4.2 Compliance with Environmental Statues

A Nevada Department of Environmental Protection permit for application of pesticides in the Virgin River has been received for the original project. An application to amend this permit shall be submitted by NDOW.

An Intra-Service Section 7 Biological Evaluation was submitted by the SNFO, which resulted in issuance of a Biological Opinion for the original EA. An amendment to this Biological Evaluation shall be submitted.

4.3 Scoping, Consultation and Coordination

4.3.1 Scoping

The original EA discusses the scoping meetings that were held in conjunction with the preparation of that document. Copies of the draft AEA Notice of Availability will be distributed to landowners adjacent to the Virgin River. The Draft AEA would be available at public points of contact, including the public libraries. A Press Release shall be issued.

4.3.2 Agency Consultation and Coordination

The following state and federal agencies were consulted during the preparation of this supplement:

U.S. Fish and Wildlife Service
U.S. Bureau of Reclamation
National Park Service
Nevada Department of Wildlife
Arizona Game and Fish Department
Southern Nevada Water Authority
Washington County Water Conservancy District

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